

BULLETIN

OF THE INSTITUTE OF METALS

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PART 20

INSTITUTE NEWS

W. H. A. Robertson Medal and Premium

The Council has awarded the W. H. A. Robertson Medal for 1952, and a Premium of Fifty Guineas, to Mr. JOHN FRANCIS WAIGHT for a paper on "Gas Equipment for the Thermal Treatment of Non-Ferrous Metals and Alloys", published in the *Journal*, 1951-52, Vol. 80, pp. 269-285.

1954 Autumn Meeting in Switzerland

The Council has very gratefully accepted an invitation from the Swiss Association of Machinery Manufacturers and the Swiss Association for Testing Materials to hold the 1954 Autumn Meeting in Switzerland.

An announcement regarding dates will be published in due course.

Rolls and Their Maintenance in the Non-Ferrous Metals Industry

It is hoped to publish in the May issue of the *Bulletin* a summary of the Informal Discussion on this subject, which was held in Birmingham on 8 January 1953.

Informal Discussion on "Lubricants for Metal-Working Operations in the Non-Ferrous Metal Industries"

An all-day Informal Discussion on "Lubricants for Metal-Working Operations in the Non-Ferrous Metal Industries", organized by the Metallurgical Engineering Committee, will be held in Birmingham on Wednesday, 6 January 1954.

Equipment for the Thermal Treatment of Non-Ferrous Metals and Alloys

"Equipment for the Thermal Treatment of Non-Ferrous Metals and Alloys" (No. 14 in the Institute's Monograph and Report Series) has now been published. It contains seven papers presented at a Symposium held during the Annual Spring Meeting last year, together with an abridged account of the discussion on them. The published price is 15s. (\$2.50), post free. Each member may obtain one copy at the privileged price of 7s. 6d. (\$1.50), post free.

Reduced Rate of Subscription for Members Retired from Active Professional Life

Members who have retired from their main professional occupation, are not less than 65 years of age, and have been members of the Institute for not less than 25 years, may claim the privilege of paying a reduced rate of annual subscription on application to the Secretary.

Publication of Short Notes in the Journal

Members are reminded that the Publication Committee is now willing to consider original communications of a length not exceeding 800 words for publication as one-page notes in the *Journal*. Such notes will be judged by the same standards as those applied to ordinary papers, but, if acceptable, they will be given a high priority in publication and will appear with a minimum of delay. An example of such a note will be found in the present issue (p. 432).

Students' Essay Prize Competition, 1952

The Council of the Institute of Metals has made two awards, of Ten Guineas each, for essays submitted in connection with the Institute's annual Students' Essay Prize Competition. The awards are to Mr. R. D. STACEY of the University of Birmingham, for an essay on "Some Experimental Evidence for Dislocations" and Mr. G. THOMAS, B.Sc., of Cambridge University, for an essay on "Martensitic Transformations in Non-Ferrous Metals and Alloys". Both are Student Members of the Institute.

Chairmen of Committees for 1953-54

The Council has appointed the following Chairmen of Committees for 1953-54:

Finance and General Purposes Committee.—MR. ALFRED BAER.

Local Sections Committee.—DR. L. B. PFEIL.

Medal Committee.—THE PRESIDENT.

Metal Physics Committee.—PROFESSOR G. V. RAYNOR.

Metallurgical Engineering Committee.—MR. W. J. THOMAS.

Nominations Committee.—THE PRESIDENT.

Publication Committee.—MR. CHRISTOPHER SMITH.

1953 Autumn Lecture

Dr. MAURICE COOK, Joint Managing Director, Metals Division, Imperial Chemical Industries, Ltd., has accepted an invitation from the Council to deliver the 1953 Autumn Lecture on the occasion of the 45th Autumn Meeting of the Institute, which will be held at Southport, Lancs., from Monday to Friday, 21-25 September.

The W. H. A. Robertson Medal and Premium

The W. H. A. Robertson Bronze Medal and a Premium of Fifty Guineas are awarded annually by the Council to the author or authors of the paper adjudged to be of the highest merit contributed to the *Journal of the Institute of Metals* on engineering aspects of non-ferrous metallurgy. No award is made if, in the Council's opinion, no paper published during the year is of sufficient merit to justify the award.

The award is open to persons of any nationality and of either sex, and to non-members as well as to members of the Institute. MSS. of papers should be addressed to the Secretary of the Institute in the normal way. All published papers are considered for the award annually by the Medal Committee, with the advice of the Metallurgical Engineering Committee.

The medal and award are placed at the disposal of the Council by the Directors of W. H. A. Robertson and Co., Ltd.,

of Zeus, of whom she was jealous. Homer says he was born lame and weak and that he dwelt with the marine divinities Thetis and Eurynome for 9 years in a grotto beneath Oceanus, where he fashioned a number of exquisite works of art, among them a golden throne with invisible chains. Later he was recalled to Olympus, where he became the great artist of the gods.

The sojourn of Hephaistos in the cavern under the sea and his fondness for the island of Lemnos is, in all probability, based on volcanic phenomena, the submarine activity of volcanic fires, and the natural features of the island of Lemnos itself. Here there were annual festivals in his honour. In one, all fires were put out for nine days, during which rites of atonement and purification were performed. Then fresh fuel was brought on a sacred ship from Delos, the fires were re-kindled, and a new life began. In October the smiths and smelters celebrated the Chalkeia, a feast of metal workers; a



FIG. A.—THE W. H. A. ROBERTSON MEDAL (Full-size).

By arrangement with the Deputy Master of the Royal Mint. Artist: Mr. Percy Metcalfe, C.V.O.

of Bedford, who, having in mind the few papers contributed to the *Journal* dealing with the engineering side of non-ferrous metal production, and believing that such papers would be to the advantage of the Institute and the industry, offered the sum of £100 a year, for a period of not less than seven years, to stimulate the writing of papers of this kind.

The objects which the donors had in mind are warmly approved by the Council, which hopes that the awards will stimulate the submission of such papers for publication by the Institute. The Metallurgical Engineering Committee will be grateful to members of the Institute if they will encourage suitable members of their staffs to submit papers of a high standard for the consideration of the Publication Committee.

The medal, which was designed by Mr. Percy Metcalfe, C.V.O., is reproduced—full size—in Fig. A.

The figure on the medal represents Hephaistos, the god of fire and smiths, who was called Vulcanus by the Romans. According to Homer he was the son of Zeus (Jupiter) and of Hera (Juno). Later traditions (Hesiod) state, however, that he had no father and that Hera gave birth to him independently

the Apātūria sacrifices were offered to him, among other gods as the giver of fire; torches were lit and hymns sung, and at the Hephaistia, finally, there was a torch race in his honour.

Hephaistos appears to have been originally simply the god of fire, but as fire is indispensable in working metals he was afterwards regarded as an artist. He made palaces of brass for himself and the other deities. His palace in Olympus was imperishable. It contained his workshop with an anvil and 20 bellows, which worked spontaneously at his bidding "blowing upon the melting pots, sending forth deft blasts of varying strength now to further his labours and now again, however Hephaistos might will it, according as his work went on. And on the fire he threw tough bronze and tin and precious gold and silver." He made the armour of Achilles, the ægis of Zeus, the sceptre of Agamemnon, the fatal necklace of Harmonia, the fire-eating bulls of Aëtes, King of Colchis. He had a forge also on Mount Mosychlos in Lemnos, possibly one under Etna in Sicily and on the sacred island of Hephaistos in the Lipari Islands where the Cyclopes were his workmen and servants. To help his lameness he made, according to

Homer, two golden maidens with the power of motion, on whom he leaned when he walked.

The lettering on the medal was the subject of considerable discussion, because the name was spelt very differently at different periods in Greek history and in different parts of the



FIG. B.

Greek world. Ultimately, on the advice given by Dr. L. R. Palmer, Professor of Greek at King's College, London, it was decided to adopt the spelling which appears on the inside of a basin of the 5th century B.C. (see Fig. B), which is illustrated in Roscher's "Lexikon der Mythologie", p. 2058.

Election of Members

The following 20 Ordinary Members, 7 Junior Members, and 17 Student Members were elected on 13 February 1953:

As Ordinary Members

- BARCLAY, Donal James, General Manager, Hudson and Wright, Ltd., Halberton Street, Birmingham 18.
- BAXTER, Laurence Cecil, General Manager, The Hockley Chemical Co., Ltd., Hockley Hill, Birmingham 18.
- BOURNE, Bernard Stather, Partner, Newall and Bourne, Consulting Engineers, Post Office Chambers, 26 Brown Street, Manchester 2.
- CLEAVER, Frederick Thomas, Wire Mill Superintendent, British Insulated Callender's Cables, Ltd., Prescott, Lancs.
- DESIRANT, M. C., Ph.D., Directeur du Laboratoire des Recherches Physiques, Ateliers de Constructions Electriques de Charleroi, Charleroi, Belgium.
- EVANS, Sydney Joseph, Works Engineer, D. F. Tayler and Co., Ltd., Newhall Works, George Street, Parade, Birmingham 3.
- GERRITSEN, Alexander Nicolaas, D.Sc., Scientist, Stichting Fundamenteel Onderzoek op het gebied van de Materie (F.O.M.), Werkgroep Metalen, Bijlhouwerstraat 6, Utrecht; and Honorary Scientific Officer, Kamerlingh Onnes Laboratorium, Rijksuniversiteit te Leiden, Nieuwsteeg 18, Leiden, Netherlands.

KIRBY, Noel Spencer, B.E., General Superintendent, Electrolytic Zinc Company of Australasia, Ltd., Box 634B, G.P.O., Hobart, Tasmania, Australia.

SAULNIER, Adrien, Chef de Section Micrographie et Rayons X, Service Recherches et Essais Physiques, Compagnie Pechiney, 1 Avenue Lorraine, Chambéry (Savoie), France.

SIMONS, Arthur John, A.C.A., Managing Director, Arthur E. Heckford, Ltd., Frederick Street and Regent Street, Birmingham 1.

SOMVILLE, Charles A., Managing Director, Société Anonyme Laminiers de l'Escaut, Burcht-Anvers, Belgium.

SPENCE, Leonard Rolls Bowness, Works Manager, British Insulated Callender's Cables, Ltd., Prescott, Lancs.

STEVENS, John Hugh, M.A., Project Manager, Canada Wire and Cable Co., Ltd., Toronto 17, Ont., Canada.

DE LA VALLÉE-POUSSIN, Raoul, Ing. Civil des Mines, Ing. Civil Elect., Directeur de la Section du Hainaut du Centre National de Recherches Métallurgiques, Université du Travail, Boulevard Solvay, Charleroi, Belgium.

VAZQUEZ LOPEZ, Jerónimo, Metallurgical Engineer, Nueva Montaña Quijano S.A., Paseo Pareda 32, Santander, Spain.

VERCHIANI, Commendatore Augusto, Ing., Ispettore Tecnico, Società Metallurgica Italiana, Borgo Pinti 99, Firenze, Italy.

WILMAN, Harry, Ph.D., D.Sc., F.Inst.P., Lecturer, Laboratory of Applied Physical Chemistry, Imperial College of Science and Technology, London, S.W.7.

WILSON, Graham Rudge, B.Sc., A.M.I.E.E., Chief Engineer, Metal Industries Division, English Electric Co., Ltd., Stafford.

WINNING, Herbert, B.Sc., D.R.T.C., A.R.I.C., Technical Manager, James Mitchell and Son (Greenock), Ltd., 7 West Stewart Street, Greenock.

YATES, Major Leonard James, Director, B. Halstead and Co., Ltd., Praed Road, Trafford Park, Manchester 17.

As Junior Members

- BEYNON, David Joshua, Deputy Chief Chemist, Richard Thomas and Baldwins, Ltd., Wern Aluminium Works, Briton Ferry, Neath, Glam.
- CRAWFORD, Henderson Black, B.Sc., A.R.T.C., Metallurgist, The Glacier Metal Co., Ltd., No. 3 Factory, Kilmarnock.
- FREHNER, Roy Charles, Research Assistant, Research Laboratories, The British Aluminium Co., Ltd., Chalfont Park, Gerrards Cross, Bucks.
- JONES, Bernard Joseph, L.I.M., Metallographer, South Wales Aluminium Co., Ltd., Rheola Works, Resolven, near Neath, Glam.
- MEREDITH, Keith Edward George, Assistant Metallurgist, Northern Aluminium Co., Ltd., Rogerstone, Newport, Mon.
- MORRIS, Russell R., Experimental Department, Non-Ferrous Die Casting Co., Ltd., Nonferdica Works, North Circular Rd., London, N.W.2.
- WADDINGTON, Peter Hatten Crouch, Standards Engineer, The English Electric Co., Ltd., Stafford.

As Student Members

- BIDWELL, Henry Thomas, Metallurgical Apprentice, The Bristol Aeroplane Co., Ltd., Filton, Bristol.
- BLAIR, Ian Scott, Student, Department of Metallurgy, University of Manchester.
- BRITTON, Roger David, Metallurgical Apprentice, The Bristol Aeroplane Co., Ltd., Filton, Bristol.

PERSONALITIES

- CALLAGHAN, John, Student of Metallurgy, University of Liverpool.
- DALTON, Patrick Leonard, Laboratory Assistant, British Non-Ferrous Metals Research Association, London, N.W.1.
- DUDLEY, John J., Bayliss, Jones and Bayliss, Ltd., Gable Street, Wolverhampton.
- EGGLETON, Maurice Arthur, Metallurgical Analyst, Earle, Bourne and Co., Ltd., Heath Street South, Birmingham 18.
- FURMIDGE, John Edward, Student of Metallurgy, King's College, Newcastle-on-Tyne.
- GARSTONE, John, B.Met., Post-Graduate Research Student, University of Sheffield.
- GRAHAM, Charles D., Jr., B.Met.E., Research Student, Department of Metallurgy, University of Birmingham.
- GRAHAM, Leslie Wilfred, Student, Department of Metallurgy, University of Manchester.
- HART, Roy Vincent, Student, Department of Metallurgy, University of Manchester.
- HILL, Roger Bryan, B.Sc., Research Student, Department of Metallurgy, University of Manchester.
- JAMES, John Melvyn, Junior Chemist, Richard Thomas and Baldwins, Ltd., Wern Aluminium Works, Briton Ferry, Neath, Glam.
- KELLERT, Bernard George, Metallurgical Laboratory Assistant, 23 Aylands Road, Enfield, Middlesex.
- PHILLIPS, Derek John, Student, Department of Metallurgy, University College, Swansea.
- SALKIELD, John Alan, Student, Department of Metallurgy, Sir John Cass College, Aldgate, London, E.C.3.

The following 17 Ordinary Members, 1 Junior Member and 8 Student Members were elected on 25 February 1953:

As Ordinary Members

- ANDERSON, Alan McNaught, Director and Production Manager, The Wolverhampton Metal Co., Ltd., Wednesfield, Wolverhampton.
- BRIDGE, Francis Downie, B.Sc., A.R.T.C., A.R.I.C., A.I.M., Head, Metallurgy Section, G.K.N. Group Research Laboratory, Lanesfield, Wolverhampton.
- DAVIS, Anthony John, B.Sc., Metallurgist, Standard Telephones and Cables, Ltd., Footscray, Kent.
- GARWOOD, Ronald David, M.Sc., Lecturer, Department of Metallurgy and Fuel Technology, University College, Cardiff.
- HACKETT, Walter, Jr., Joint Managing Director, Accles and Pollock, Ltd., Oldbury, Birmingham.
- HIRSH, Walter L., Metallurgist, Research Laboratories of The General Electric Company, Ltd., Wembley, Middlesex.
- INDULSKI, Jerzy, G.I.Mech.E., Technical Assistant, Standards and Specifications, The English Electric Co., Ltd., Rugby.
- JAMES, Thomas Claude, Chairman and Managing Director, The Wolverhampton Metal Co., Ltd., Wednesfield, Wolverhampton.
- JOHNSON, Edwin Done, O.B.E., A.I.E.E., Production Director, The Indian Cable Co., Ltd., Golmuri, Jamshedpur 3, India.
- JONES, (Mrs.) Joyce Eveline, B.Sc., D.R.T.C., Senior Scientific Officer, Metallurgical Branch, Armament Research Establishment, Woolwich, London, S.E.18.
- MILLER, John Leonard, D.Eng., Ph.D., M.I.E.E., F.Inst.P., Chief Consultant Engineer, British Insulated Callender's Cables, Ltd., Prescott, Lancs.
- MUNIR, Mohamed Zaki, B.Sc., Ph.D., Senior Lecturer, Technology and Metallurgy, Cairo University, Egypt.

- PINHEIRO, Vitor Pinto, Lecturer in Metallurgy, Laboratório de Metalurgia, Instituto Superior Técnico, (affiliated to Universidade Técnica de Lisboa), Lisbon, Portugal.
- RICHARDSON, Henry Taylor, B.Sc., Works Metallurgist, W. J. Fraser and Co., Ltd., Monk Bretton Works, Barnsley, Yorks.
- SHEPPARD, John Alan, Technical Manager, The Metallizing Equipment Co., Ltd., 58 Victoria Street, London, S.W.1.
- WELDON, Brian Arthur, B.Sc., Investigator, British Non-Ferrous Metals Research Association, Euston Street, London, N.W.1.
- YOUNG, John Joseph, General Manager, Minworth Metals, Ltd., Minworth, Birmingham.

As Junior Member

- SAVAS, John, B.S.(Met.Eng.), Metallurgist, Packard Motor Car Company, Detroit 32, Mich., U.S.A.

As Student Members

- ADAMS, Howland K., Jr., B.Met.Eng., Graduate Student, Department of Metallurgy, Rensselaer Polytechnic Institute, Troy, N.Y., U.S.A.
- BELK, John Anthony, B.Sc., Research Student, Department of Physics, Royal Holloway College (University of London), Englefield Green, Surrey.
- BURDON, Peter James, Scientific Assistant, Mitcham Works, Ltd., Mitcham Junction, Surrey.
- KING, Errol George, B.Sc.(Eng.), Scientific Officer, Ministry of Supply Factory, Springfields, Salwick, near Preston, Lancs.
- LEWELLYN, David Thomas, Student of Metallurgy, University College, Swansea.
- MARTIN, John Cory, Metallurgical Apprentice, Stewarts and Lloyds, Ltd., Bilston, Staffs.
- SKINNER, John, Student of Metallurgy, Sir John Cass College, London, E.C.3.
- TANGRI, Krishan K., M.Sc., Research Fellow, Metallurgy Department, Missouri School of Mines and Metallurgy, Rolla, Mo., U.S.A.

PERSONALITIES

Professor Georg Masing

(Institute of Metals (Platinum) Medallist 1953)

Georg Masing was born on the 2 February 1885, in St. Petersburg, Russia, where his father was a chemist. He was educated at the Humanistische Gymnasium there, and then studied chemistry in St. Petersburg before going, in the autumn of 1905, to Göttingen University as a pupil of Professor G. Tammann. He received his Doctorate in 1909 for a thesis "On the Formation of Compounds under Pressure and the Reactions of Metals in the Solid State".

He then entered industry in Berlin, and in 1922 was made head of the Metallographic Department of the Research Laboratory of the Siemens concern. In that capacity he carried out extensive experiments in many fields. As a result of his work, Masing was offered the Directorship of the K.W. Institut für Metallforschung, Stuttgart, when it was founded in 1933, but he declined the post. In 1937 the Deutsche Gesellschaft für Metallkunde awarded him the Heyn medal, and in the same year he accepted the appointment of Director of the Institut für allgemeine Metallkunde at Göttingen University. He has held that position, in

PERSONAL NOTES

succession to Professor Tammann, ever since. In December 1952 the Technical University of West Berlin made him an honorary Doktor-Ingenieur.



Masing's work covers a great range of metallurgical subjects, both theoretical and practical, and he is the author of a large number of papers in the technical and scientific press. In 1926 he developed the alloys of beryllium in co-operation with O. Dahl. After two smaller books, "Ternäre Systeme" and "Grundlagen der Metallkunde", he published his comprehensive "Lehrbuch der allgemeinen Metallkunde" in 1950.

Dr. C. E. Ransley
(Rosenhain Medallist 1953)

Charles Eric Ransley was born in London in 1910 and educated at Wembley County School. On leaving school he joined the Research Laboratories of The General Electric



Co., Ltd., as a student-assistant, and graduated in chemistry at London University in 1932. He took an M.Sc. degree in 1936, and gained a Ph.D. in 1940 for his work in the field of

gas-metal reactions. As a member of the metallurgical staff of the G.E.C. Laboratories, he was engaged in research on various problems connected with the manufacture of lamps and thermionic valves, but during the period 1940-1945 he worked mainly on the development of special devices for radar applications. In 1945, he took up his present position with The British Aluminium Co., Ltd., at their then newly-established Laboratories at Gerrards Cross, Bucks, where he is in charge of a group studying various aspects of the casting and fabrication of aluminium and its alloys.

Dr. Ransley has published a number of papers on metallurgical subjects in the *Journal* of the Institute of Metals and elsewhere, and serves on several committees concerned with various aspects of metallurgical research. He is the present Chairman of the London Local Section of the Institute.

Mr. J. F. Waight
(W. H. A. Robertson Medallist 1953)

John Francis Waight received his technical education at the Woolwich Polytechnic and graduated at London University in 1935, with a degree in Engineering.



He was employed then by the South Metropolitan Gas Company, where he was engaged in the Industrial Department and the Physical Laboratory, on the design and construction of gas-fired heat-exchange equipment.

In 1945 he transferred to the City of Birmingham Gas Department as Assistant Superintendent of the Industrial Heating Section. He is now Industrial Engineer to the West Midlands Gas Board.

PERSONAL NOTES

MR. E. G. BAYLISS, Chief Metallurgist to John Garrington and Sons, Ltd., has been made an Honorary Associate of the Birmingham College of Technology.

MR. W. F. BRAZENER, Managing Director of The Mint, Birmingham, Ltd., has been made an Honorary Associate of the Birmingham College of Technology.

LETTERS TO THE EDITOR

MR. E. H. BUCKNALL has been appointed Director of the recently established National Metallurgical Laboratory, Jamshedpur, India, and left England on 12 February. Since 1944 he had been Principal Assistant to the Superintendent of the Birmingham Laboratory of The Mond Nickel Co. Ltd. For a number of years Mr. Bucknall was Secretary of the Birmingham Local Section of the Institute.

MR. D. DAVIES has left Aluminium Die-Castings (Birmingham), Ltd., in order to take up an appointment as Chief Metallurgist to The Mint, Birmingham, Ltd.

MR. T. FITZGERALD has left the National Gas Turbine Establishment, Leicester, and returned to the Defence Research Laboratories, Melbourne, Australia.

MR. O. B. J. FRASER, Assistant Manager, Research and Development Division, The International Nickel Co., Inc., has received the Samuel Wylie Miller award of the American Welding Society, for meritorious achievements in the art of welding.

PROFESSOR ANDRÉ GUINIER, Professor of Physics at the Sorbonne, has been appointed visiting Professor of Physical Metallurgy in the Department of Mining and Metallurgical Engineering, University of Illinois.

DR. D. S. OLIVER has relinquished his post in the Physics Department, University of Bristol, and is now employed by the Ministry of Supply at the Metallurgical Laboratories, Division of Atomic Energy (P), Culcheth, near Warrington, Lancs.

MR. E. W. ROBERTS has left England for Bahrain, Persian Gulf, to take up an appointment with the Bahrain Petroleum Co., Ltd.

MR. STANLEY ROBSON has been appointed Secretary of the Royal Institution.

MR. C. F. ROGERS is now engaged as Metallurgist with Bound Brook Bearings (G.B.), Ltd., Lichfield.

MR. JAMES S. VANICK, Research Metallurgist, The International Nickel Co., Inc., New York, has received the annual award of the Grey Iron Founders' Society for contributions to the grey iron-founding industry.

Deaths

The Editor regrets to announce the deaths of:

MR. EDWARD M. FOSTER, Manager of Beryllium and Copper Alloys, Ltd., on 28 January 1953.

MR. WILLIAM ARTHUR FOWLER, Production Manager of The British Aluminium Co., Ltd. Mr. Fowler died suddenly at the Company's offices in St. James's Square, London, on 16 February.

OBITUARY

Mr. A. Pinkerton

Andrew Pinkerton, who died on 11 January 1953, was the elder son of Alexander Pinkerton of Glasgow and was born on the 10 June 1888. He received his early education at the Allan Glen School, Glasgow, and from there passed to the Royal Technical College. His first appointment was with the Glasgow City Analyst, with whom he spent three or four years. His next post was with the Rio Tinto Copper Mines in Spain, where he remained until the outbreak of the First World War, returning to join the Forces. From the

ranks of an infantry battalion he obtained a commission, and with his technical qualifications he was posted to the special gas company of the Royal Engineers. His military service was distinguished, and he was awarded the Military Cross early in 1918. On demobilization he joined the metallurgical staff of Earle, Bourne and Co., Ltd., Birmingham, and in a year or so became Chief Metallurgist on the resignation of the then chief. He rendered notable service to the Company, and was responsible, in large measure, for the technical advances made by the Company in its varied range of products.

Mr. Pinkerton enjoyed a considerable reputation in the non-ferrous metal industry, and his contributions and services to the metallurgical societies were outstanding. He had been a Member of the Institute since 1923, and had served as President of the Birmingham Metallurgical Society. He had a very strict sense of personal honour, and all who had the benefit of his friendship held him in the highest esteem.

LETTERS TO THE EDITOR

Picturesque "Whisker" Growth on Copper

In view of the scanty published data on whisker growth on metals in general¹ and on copper in particular,^{2,3} it may

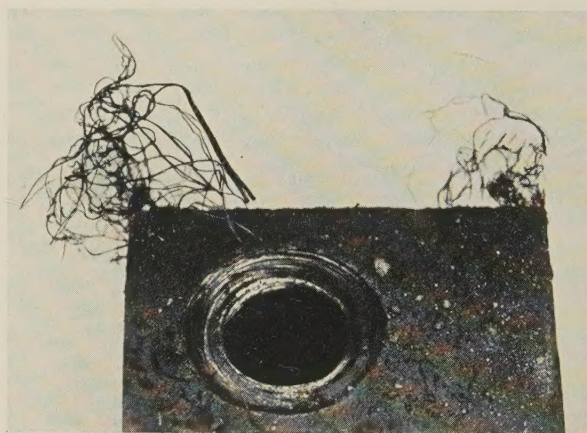


FIG. 1.—Whisker Growth on Block of High-Conductivity Copper.
× 2 approx.

be worth putting on record some recent observations, together with some tentative suggestions as to the possible mechanism of formation of whiskers.

Compton, Mendizza, and Arnold,¹ in an investigation of filamentary growth, mainly on plated surfaces, stated that copper specimens develop whiskers only in the presence of sulphur (at temperatures up to 110° F. (43° C.)). Percy,² in 1861, recorded the formation of the so-called "moss copper" during the smelting of certain copper ores. Although moss copper forms in the region of 1100° C., the phenomenon appears to be similar to that described below. Liversidge³ considered the formation of moss copper, silver, and gold as occurring "spontaneously", and classed the phenomenon as "crystallization by thermo-reduction".

Fig. 1 shows an example of the growth observed on a block of commercial high-conductivity copper. The copper specimen was placed inside a furnace used for annealing large steel sheets. The heat-treatment consisted of heating slowly to 850° C., maintaining this temperature for approximately

24 hr., and cooling slowly; the total time of heat-treatment was about 3 days. The atmosphere was "its own", i.e. atmospheric air initially, changing, by reaction with the silicon-iron, to a complex mixture consisting mainly of N_2 , CO, CO_2 , CH_4 , and H_2 .

Unlike the whiskers found on cadmium, zinc, tin, &c.,¹ the copper whiskers formed in the present investigation are neither single crystals nor twinned, but are polycrystalline, as was shown by Laue X-ray photographs. The diameter of the whiskers varies from 0.01 to 0.001 cm., which is much larger than those found hitherto. They are not always cylindrical, but have an "extruded" appearance, with numerous parallel grooves along their length.

Micrographs of the copper block were examined before and after the heat-treatment. Numerous cavities, both spherical and intergranular, in the heat-treated specimen suggested that, owing to segregation of impurities, low-melting-point regions are formed locally, and subsequently ooze out. This theory, however, is disproved by the fact that the whiskers consist of copper of the same lattice dimensions (within experimental error) as the base. A large percentage of alloying element would be required to depress the melting point of copper by 200°C., and furthermore such an alloy would tend to form a globule immediately after its protrusion through the surface. Such globules can be observed in the photograph, in addition to the whiskers. Spectrographic analysis indicated the presence of silicon, aluminium, manganese, and tin in the whiskers, though these elements were not present in the base metal, and the amount of iron present had apparently increased. These facts are most probably due to the formation of an evaporated film of these elements on the whiskers. Their presence in solution was not detected by X-ray techniques.

Bearing in mind the extruded appearance, an alternative explanation is that hydrogen in the atmosphere diffuses into the copper and reacts with the oxide inclusions to form steam. This steam will be under high pressure, and as the copper at the temperatures concerned will be mechanically weak, some of the copper will be caused to spurt out in the form of whiskers.

The precise mechanism of whisker growth is, however, by no means clear, and the tentative suggestions proposed above are open to criticism. This is further apparent when it is borne in mind that growth occurs only when the specimens are above earth potential (in this case 200 V.). The manner in which the whiskers tend to concentrate at the corners of a specimen suggests that the growth is connected with electrical discharge. The author would welcome suggestions to explain this interesting phenomenon.

R. J. WAKELIN

G.K.N. Group Research Laboratory,
Wolverhampton.

REFERENCES

1. K. G. Compton, A. Mendizza, and S. M. Arnold, *Corrosion*, 1951, 7, (10), 327.
2. John Percy, "Metallurgy", p. 359. London: 1861.
3. A. Livensidge, *Chem. News*, 1877, 35, 68.

Intercrystalline Cracking of Metals

In connection with recent correspondence on intercrystalline failure,^{1,2} I should like to draw attention to an unusual example, namely, delayed intercrystalline failure at room temperature in a "stiff" metal.

This failure occurs in cast, ternary β -brass containing 4% aluminium. In the ordinary tensile test the brass has approximately the following characteristics: ultimate tensile stress, 40 tons/in.²; elongation, 14%; limit of proportionality, 10 tons/in.²; 0.1% proof stress, 24 tons/in.². In this test the fracture is transcrystalline. However, under a sustained tensile stress of 25 tons/in.², in air, intercrystalline cracking and failure occur within a few days. After the initial loading, no appreciable extension has been detected before fracture. Similar failure also occurs when the specimen is immersed in liquid paraffin and machine oil.

The weakness was discovered during an investigation into the intercrystalline failure of high-tensile β -brasses immersed in sea-water.³ Although no aggravation by sea-water of the failure of the aluminium brass under sustained stress could be detected, immersion in sea-water caused lower figures in the ordinary tensile test and fractures of intercrystalline inception.

There is some information indicating that the weakness of the brass may be due to the presence of extremely fine particles of the brittle γ phase. On this basis there are likely to be two factors at work. First, in air under sustained stress the growth of cracks from the brittle phase is indicated; in this connection, it should be noted that the time for failure is not constant, ranging from a few hours to several days. The second feature is the aggravating effect of the sodium chloride in the ordinary tensile test. This may be an electrochemical action producing stress-corrosion, or alternatively a surface-tension effect.⁴

Experiments are in progress to test these ideas and to determine whether the mechanical brittleness is manifested in other ways. Meanwhile, it would be interesting to have views on how the failure in question fits in with the theories proposed in the earlier correspondence.

A. R. BAILEY

Constantine Technical College,
Middlesbrough.

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NEWS OF LOCAL SECTIONS AND ASSOCIATED SOCIETIES

London Local Section

On 21 January the London Local Section held a joint meeting, at University College, with the London and South Eastern Counties Section of the Royal Institute of Chemistry and the London Section of the Society of Chemical Industry. The speaker was Dr. A. C. MENZIES and his subject was:

Analysis of Metals by Spectroscopy

The lecturer began by outlining and demonstrating the production of spectra by gratings and prisms, using as his practical subject mercury vapour. The development of emission instruments was then traced from earliest times to the present day. Modern developments are now principally concerned with improved and more rapid methods of line-

JOINT ACTIVITIES

density measurement, but improved source units, such as the triggered arc circuit, are being developed.

Dr. Menzies discussed the difficulties attending accurate determinations of certain elements, and quoted as examples phosphorus and sulphur in steel. In extreme cases resort may have to be made to evacuated and short-path instruments to reduce absorption.

The theory of emission and absorption of spectral lines was described in some detail. A study of the electronic changes in energy level accompanying emission of radiation enables the optimum line-pairs for analysis of particular combinations of elements to be selected, and the factors influencing such a selection were discussed.

A practical demonstration, given with a three-electrode arc, served a twofold purpose: it showed migration of ions in a D.C. arc and the preferential emission of radiation requiring a lower excitation potential; in the example used, emission from copper was partially suppressed by potassium.

Finally, the newer direct-reading instruments were described. A demonstration of the possibilities of this type of instrument was given, using a medium quartz spectrograph with photo-multiplier equipment.

At a meeting of the Section held at 4 Grosvenor Gardens, London, S.W.1, on 5 February, Dr. N. P. ALLEN, Superintendent of the Metallurgy Division, National Physical Laboratory, Teddington, gave a lecture:

Titanium

Dr. Allen said that the manufacture of titanium and its alloys had developed in the U.S.A. during the last six years and had now reached a scale such that masses of over a ton weight were handled, and the output was of the order of 6-8 tons per day. Production on a somewhat smaller scale had been developed in England. The commercially pure metal had the strength of a mild or medium-carbon steel, and had good hot-working properties. The working properties in the cold, on account of the hexagonal structure of the metal, were not so good. Oxygen, nitrogen, carbon, and hydrogen had pronounced effects on its ductility. The alloys of titanium could be classified and understood by considering the effect of the added element on the temperature of the α/β change. Some alloys had the strength and toughness of heat-treated high-tensile alloy steels. Their properties were not yet fully under control, however, and study of the impurities in the alloys was important.

The titanium alloys had outstanding resistance to corrosion and corrosion-fatigue. Their strength was well maintained at temperatures up to 400° or 500° C., though above this temperature they declined seriously. Alloys were available that up to 250° C. or higher were superior to austenitic steels and aluminium alloys on a strength-for-weight basis. Titanium alloys were likely to replace high-tensile alloy steels and stainless steels to a considerable extent in aircraft, in positions where the temperature was not above 500° C., but, on account of their low modulus of elasticity, they would not replace aluminium alloys in aircraft structures for some time. The high cost of titanium was likely to hinder its wide general application, unless improved and cheaper methods of extraction could be found.

South Wales Local Section

At a meeting held at University College, Swansea, on 3 March, Mr. E. S. W. EARDLEY, of The Incandescent Heat Co., Ltd., gave a lecture on:

Recent Advances in Furnace Design

The lecturer began by describing the developments which had taken place in the past few years in the component parts that went to make up the furnace structure proper. These included: the concentrated combustion burner; the dual-type burner, suitable for use with either oil or gas; the jet-type recirculating radiant tube; developments in flat arch construction; and the centrifugally cast roller in heat-resisting alloys.

Mention was made of the way in which dust collection, the hot-blast cupola, continuous dielectric core drying, and low-temperature annealing, had improved foundry practice.

The paper outlined the salient features of the walking-beam furnace, its application to bar and pack heating in mechanized mills, and to plate heating.

Mr. Eardley went on to point out the advantages of continuous strand annealing of ferrous and non-ferrous materials, and also described recent advances in direct-fired lift-off furnaces for the annealing of steel sheets, high-speed billet heating, gas carburizing, low-temperature recirculation for galvanizing baths, &c., continuous heat-treatment lines for armour plate, and a new furnace for heating bars.

Finally, a description was given of equipment for the production of controlled atmospheres.

JOINT ACTIVITIES

Joint Committee for National Certificates in Metallurgy

The Joint Committee of the Iron and Steel Institute, the Institution of Mining and Metallurgy, the Institute of Metals, and the Institution of Metallurgists, in conjunction with the Ministry of Education, has issued its report on the progress of the scheme for the award of National Certificates in Metallurgy for the year 1951-52. Dr. J. W. Jenkin is the Chairman.

The Joint Committee has approved five new Schemes for National Certificates in Metallurgy during 1952; other Schemes have been revised, and Schemes are also being organized in districts not yet covered, with a view to suitable courses being started as soon as possible.

Final examinations of the Course for the Ordinary National Certificate have been held during 1952 at 28 Technical Colleges, and for the Higher National Certificate at 16 Technical Colleges, for candidates who have satisfied the conditions laid down in Ministry of Education Rules III, under which the Schemes are operated.

The Committee is pleased to report that: (a) 178 candidates have qualified for the award of an Ordinary National Certificate in Metallurgy and 103 candidates have qualified for the award of a Higher National Certificate as a result of final examinations held in 1952. (b) The records of a further 5 candidates for the Ordinary Certificate and 3 for the Higher have been approved by the Joint Committee, subject to the fulfilment of certain conditions. (c) Eight candidates for the Ordinary and six candidates for the Higher Certificate, who entered the final examinations in 1951, and whose records were approved by the Joint Committee subject to certain provisions, have qualified for the award of Certificates in 1952. (d) The Committee has also approved the award of the Ordinary Certificate to 8 candidates, and the Higher Certificate to 17 candidates, who entered the final examinations in 1951, but whose records were not available at the date

JOINT ACTIVITIES

of publication of the Report for 1950-51. (e) Distinctions have been gained by 38 candidates who have shown an exceptional grasp of their subjects, indicating a high degree of training and knowledge in the particular subject in which the Distinction has been gained.

Comparative figures of entries and successful candidates for the seven years since the institution of the Scheme for National Certificates in Metallurgy are as follows:

(i) Ordinary National Certificate

Year	Technical Colleges	Total Number of Candidates			
		Entered	Awarded Certificates	With Distinction	With Prize Award
1946	4	28	23	4	7
1947	11	102	69	14	17
1948	15	123	74	12	16
1949	21	222	107	24	27
1950	20	281	142	23	26
1951	25	314	138	17	24
1952	28	334	186*	22	31

(ii) Higher National Certificate

Year	Technical Colleges	Total Number of Candidates			
		Entered	Awarded Certificates	With Distinction	With Prize Award
1946	—	—	—	—	—
1947	2	22	18	—	1
1948	8	38	22	1	2
1949	10	74	59	20	22
1950	11	62	42	8	10
1951	16	110	54	5	11
1952	16	132	120*	16	22

* The results of 8 candidates for the Ordinary Certificate and 17 candidates for the Higher Certificate whose records were not available in 1951 have been included in 1952.

Prizes have been awarded in 1952 to 53 successful candidates who have shown particular merit in the final examinations, from the Prize Fund established by the Iron and Steel Institute, the Institution of Mining and Metallurgy, and the Institute of Metals for the purpose.

Attention is drawn to the revised Regulations for Admission to Membership of The Institution of Metallurgists, published in September, 1951, which provide for admission to Licentiate-ship of the Institution by examination of candidates holding an Ordinary National Certificate in Metallurgy in which Chemistry and Physics are assessed subjects in the final year, and Mathematics an assessed subject in the pre-final year. The Regulations also make provision for admission to Licentiate-ship and for exemption from the Institution's examination for candidates producing evidence as follows:

"D.—(1) Having obtained Higher National Certificate in Metallurgy and having been notified in the pass list issued by the Joint Committee for National Certificates in Metallurgy that exemption standard has been reached in at least three subjects of the Final Examination (including endorsement subjects). Holders will be exempted from the Institution's examinations on a subject for subject basis. Exemption standard will approach the standard required for distinction. Candidates claiming exemptions under this regulation must

have obtained their Certificate at a College whose syllabuses have been approved by the Institution for the purpose of this regulation.

(2) All candidates granted exemption under this regulation will be required to sit the Institution's examinations in the remaining sections (if any) for the Licentiate-ship (see page 13 of the Regulations), and must (a) produce evidence of having done metallurgical work of sufficient merit and (b) attend for an oral examination or interview."

The Joint Committee has agreed to an amendment of paragraphs 2 and 3 of Section 17 of Ministry of Education Rules 111. The two paragraphs in question will be re-worded to read:

"As soon as possible after the scripts of the examination of the final year have been marked by the examiners, and in any case not later than 1 July in any year, the examinations officer must forward them to the Committee, together with Forms 329 F.E. and 330 F.E. completed as far as applicable. The Forms 329 F.E. and 330 F.E. will exhibit the records of the candidates for the several years of their course in respect of—

(i) Attendance.

(ii) Marks for homework, for laboratory work and records, and for drawings, if any.

(iii) Examination marks."

A short Refresher Course in Metallurgy organized by the Ministry of Education for teachers of Metallurgy in Technical Colleges was held during the Easter Vacation, 1952. The Joint Committee is pleased to note that the course, which dealt with modern metallurgical techniques, was very well attended and successful, and the Chairman, who visited the Course, was much impressed by the enthusiasm of those attending.

Mond Nickel Fellowships

The Mond Nickel Fellowships Committee now invites applications for the award of Mond Nickel Fellowships for the year 1953. Awards will be made to selected applicants of British nationality educated to University degree or similar standard, though not necessarily qualified in metallurgy, who wish to undergo a programme of training in industrial establishments; they will normally take the form of travelling Fellowships; awards for training at Universities may be made in special circumstances. There are no age limits, though awards will seldom be given to persons over 35 years of age. Each Fellowship will occupy one full working year. The Committee hope to award up to five Fellowships each year to an approximate value of £900 to £1200 each.

Mond Nickel Fellowships will be awarded in furtherance of the following objects:

(a) To allow selected persons to pursue such training as will make them better capable of applying the results of research to the problems and processes of the British metallurgical and metal-using industries.

(b) To increase the number of persons who, if they are subsequently employed in executive and administrative positions in the British metallurgical and metal-using industries, will be competent to appreciate the technological significance of research and its results.

(c) To assist persons with qualifications in metallurgy to obtain additional training helpful in enabling them ultimately to assume executive and administrative

positions in British metallurgical and metal-using industries.

(d) To provide training facilities whereby persons qualified in sciences other than metallurgy may be attracted into the metallurgical field and may help to alleviate the shortage of qualified metallurgists available to industry.

Applicants will be required to state the programme of training in respect of which they are applying for an award, as well as particulars of their education, qualifications, and previous career. Full particulars and form of application can be obtained from: The Secretary, Mond Nickel Fellowships Committee, 4 Grosvenor Gardens, London, S.W.1.

Completed application forms will be required to reach the Secretary of the Committee not later than 1 June 1953.

NEWS OF KINDRED SOCIETIES

Institution of Metallurgists Examinations

The next Examinations for the Licentiate and Associate-ship of The Institution of Metallurgists will be held from 24 August to 1 September 1953. Candidates must submit their applications for permission to enter the examinations before 1 May 1953.

Each application must be made on a form to be obtained from the Registrar-Secretary, The Institution of Metallurgists, 4 Grosvenor Gardens, London, S.W.1, and must be accompanied by a registration fee of one guinea. The balance of the examination fee will be payable before 1 August 1953.

Details of the various Centres at which the Examinations will be held, and arrangements for the Examinations will be forwarded to all candidates in due course.

Examinations for the Fellowship will also be held between 24 August and 1 September 1953, and intending candidates should apply for permission to enter for the examination, submitting, for the approval of the Council, a statement of the subject of the dissertation or the branch of metallurgy in which they offer themselves for examination.

The Physical Society Exhibition of Scientific Instruments and Apparatus

The 37th Annual Exhibition of the Physical Society will be held at the Imperial College of Science and Technology, Imperial Institute Road, London, S.W.7, from Monday, 13 April to Friday, 17 April 1953. A return has been made to the practice of former years of locating the whole of the exhibition in the main buildings of the College, and this should be of great convenience to visitors.

Following the normal policy of the Society, the great number of exhibits appeals primarily to physicists, and much new and original equipment will be on show. Among the many modern aspects of science dealt with in the exhibition are the problems arising out of high-speed flight, industrial use of radio-isotopes, and the applications of telecommunications and radar in modern travel.

As in previous years, the comprehensive Handbook of the Exhibition will be available at the Exhibition, and copies can be obtained on application to the Secretary-Editor, the Physical Society, 1 Lowther Gardens, Prince Consort Road, London, S.W.7. The price of the publication is 6s. (by post 7s. 3d.).

OTHER NEWS

Research on the Constitution of Alloys

Several significant gaps in current research on alloy constitutions are commented on in a statement by the Constitution of Alloys Group (Chairman: Professor G. V. Raynor) of the British Iron and Steel Research Association. The Group also indicates some ways in which it is willing to help fill the gaps.

In calling attention to these possible lines of research, the Group emphasizes its desire to encourage new and existing work on the subject of the constitution of alloys. It is prepared to suggest systems requiring investigation, and to put enquirers in touch with other workers in the same or similar fields. In particular cases, where the results of such work are likely to be of direct interest to the iron and steel industry, the Group is able to make recommendations for some financial assistance. The Group would also be glad to know of existing equilibrium-diagram work which has not been reported to it, and of projected research programmes involving the constitution of alloys. Those interested should communicate with the Secretary, Constitution of Alloys Group, British Iron and Steel Research Association, 11 Park Lane, London, W.1.

The gaps in research work that the Group's reviews have indicated can be summarized as follows:

(i) Although there appears to be no obvious gap in research work on high-temperature materials, a greater effort might well be expended in this field, owing to the relatively slow rate of progress dictated by the difficulties. In particular, more work is needed on the higher-melting-point alloys of Groups V and VI. Concerning materials to resist wear and high temperatures, it is felt that much more information is required on systems containing borides and that equilibrium relations in ferrous alloys containing silicides are probably equally in need of study.

(ii) There is a surprising lack of research in the general field of ferrous alloys, except in so far as the constitution of several alloy systems involving phases with the structure of the Fe-Cr sigma phase is being adequately studied. It is felt that certain systematic work on the binary alloys of iron would be of value, both from the theoretical point of view and to serve as a basis for studies of the complex equilibria involved in ternary and quaternary alloys. Further, the relationships between the various carbides present in alloy steels offer a wide field.

(iii) The constitution of magnesium alloys appears to be receiving little attention, and in view of the importance of these materials to aeronautical engineering, a more concentrated study may be necessary, particularly of ternary and more complex alloys. The response to heat-treatment of magnesium alloys is, in general, not good, and constitutional work on this subject would be of value.

(iv) The constitutional background required for the proper development of materials of the high-tensile-brass type and the complex bronzes is still obscure.

(v) On the theoretical side, it appears to the Group that the contribution made by those interested in the determination of the crystal structures of intermetallic phases and in accurate lattice-spacing measurements is of much importance, and that greater effort in this field would not be inappropriate. Further problems connected with the theory of metals and alloys arise in the purely physical field (e.g. X-ray emission and absorption experiments on alloys, magnetic properties,

low-temperature specific heats), and a more intimate contact between the physicist and the metallurgist interested in the general theory of alloys would be an advantage.

It should be noted that in this statement no attempt is made to review the present position with regard to all types of alloy. No mention has been made of cases in which the Group felt that the research effort was reasonable, having regard to the various problems involved. There is no implication that subjects and systems not mentioned are of lesser interest.

Protection from Radiation

In view of the growing use of X-rays and radiation from radioactive isotopes in industry and elsewhere, the Board of the Institute of Physics has again directed attention to the need to take simple precautions against risks to health arising from the absorption of radiation. A short bibliography of information on the subject is given below. Further information can be obtained from any of the following:

The Director, National Physical Laboratory, Teddington, Middlesex.

The Hospital Physicist at the nearest hospital.

Regarding industrial uses

The Chief Inspector of Factories, 8 St. James's Square, London, S.W.1.

Regarding the use of radioactive isotopes

The Director, Atomic Energy Research Establishment, Harwell, Didcot, Berkshire.

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1. *Memorandum on Gamma-Ray Sources for Radiography* (obtainable from The Institute of Physics, 47 Belgrave Square, London, S.W.1. Price 3s. 6d. net).
2. *Handbook of Industrial Radiology* (published for The Institute of Physics by Edward Arnold and Co., 41 Maddox Street, London, W.1. Price 21s.)
3. *X-ray Protection Design*, by H. O. Wycoff and L. S. Taylor, being Handbook 50 of the National Bureau of Standards (published by the Government Printing Office, Washington 25, D.C., U.S.A. Price 15 cents).
4. *Factories (Luminising) Special Regulations 1947*, No. 865 (published by H.M. Stationery Office. Price 2d.)
5. *Recommendations of the International Commission on Radiological Protection, 1950* (copies obtainable (gratis) from The Faculty of Radiologists, 45 Lincoln's Inn Fields, London, W.C.2.)
6. *Introductory Manual on the Control of Health Hazards from Radioactive Materials, Issue No. 2, 1949* (copies obtainable (gratis) from the Medical Research Council, 38 Old Queen Street, London, S.W.1.)
7. *Recommendations of the British X-ray and Radium Protection Committee, 7th Revised Report, October 1948* (obtainable from the Director, National Physical Laboratory, Teddington, Middlesex).

Summer School and Conference on the Theory of the Plastic Deformation of Metals

The H. H. Wills Physical Laboratory and the Department of Adult Education of the University of Bristol, in co-operation with The Institute of Physics, will be conducting a short Summer School followed by a conference on "The Theory of the Plastic Deformation of Metals, with Special

Reference to Creep and to Fatigue" from 13 to 16 July next in Bristol. The provisional programme of the course which will precede the conference includes lectures by Professor N. F. Mott, Dr. A. J. Forty, and Dr. F. C. Frank. The course is similar in conception to those held in the University of Bristol on this and similar subjects; it is intended mainly for research students at universities and for members of the staffs of government and industrial laboratories. The particular aim is to see to what extent the observed phenomena can be explained in terms of present theories, and to guide future work.

The fee for the Summer School, which will be on 13 and 14 July, is £1 10s. 0d.; but there will be no fee for the conference.

Further particulars and forms of application, to be returned before 31 May, can be obtained either from the Director of the Department of Adult Education, The University, Bristol 8, or from the Secretary of The Institute of Physics, 47 Belgrave Square, London, S.W.1.

B.W.R.A. Summer School of Welding

The third Summer School of Welding organized by the British Welding Research Association will be held at Ashorne Hill, near Leamington Spa, Warwickshire, from Monday, 27 April, until Saturday, 2 May 1953.

This year the general theme of the School is welding fabrication and production, and the various aspects will be covered in logical sequence during the course. The School will start with introductory lectures giving critical and comparative studies of welding processes, plant, and basic materials. Students will then be given full instruction in welding design, followed by lectures on the study of works planning and welding costs and the more efficient use of up-to-date processes such as automatic welding, &c. Finally, the use of standardization, time-and-motion study, and other means of improving productivity will be dealt with. The course will also include lectures on the non-destructive testing and inspection of welds.

To assist industrial organizations whose staff may be more particularly interested in one aspect of welding, the School has been divided into certain groups. Students will be given lectures of general interest, usually in the morning, followed in the afternoon by lectures on more specialized subjects under five group headings:

- Group A: Aircraft Industry
- Group B: Shipbuilding Industry
- Group C: Structural Engineering
- Group D: Automobile and Sheet Metal Industries
- Group E: General Engineering.

The School will be of great use to designers, technicians, engineers, and indeed to all those interested in improving welding methods and production efficiency. As vacancies are limited, it is suggested that those wishing to attend the School, or to send representatives from their organizations, should communicate as soon as possible with the Secretary, B.W.R.A. Summer School of Welding, British Welding Research Association, 29 Park Crescent, London, W.1, requesting the necessary application forms and full particulars.

Errors in the A.S.T.M. Index

The A.S.T.M. Index of X-ray Powder Diffraction Data has now been in use for about ten years, and it is recognized that it contains a number of wrong identifications which are likely to lead to confusion. The X-ray Analysis Group of The

DIARY

Institute of Physics therefore proposes to collect information on the errors which have been observed by users of the Index and to publish as soon as possible in some suitable way a list of all those errors which seem to be substantiated. It is believed that many, if not all, of these errors have by now been noted by various workers and may in some cases have been mentioned casually in their publications, but in order to be of real use to others it is necessary that they should all be published collectively. Accordingly, everyone who has noted such errors is asked, whether he has already published them or not, to send the details to Dr. A. J. C. Wilson, University College, Cathays Park, Cardiff.

DIARY

- 9 April. Liverpool Metallurgical Society.** Annual General Meeting, followed by "The Basic Processes Involved in the Tempering of Plain Carbon and Low-Alloy Steels", by Dr. W. S. Owen. (The Temple, Dale Street, Liverpool, at 7.0 p.m.)
- 15 April. Society of Chemical Industry, Corrosion Group.** "The Corrosion of Aluminium and Its Alloys in Supply Waters", by C. F. Porter. (Chemical Society, Burlington House, Piccadilly, London, W.1, at 6.30 p.m.)

- 16 April. Institution of Mining and Metallurgy.** General Meeting. (Geological Society, Burlington House, Piccadilly, London, W.1, at 5.0 p.m.)
- 17 April. Institute of Physics.** Symposium on "Practical and Theoretical Aspects of Ultrasonic Testing". (Institute of Physics, 47 Belgrave Square, London, S.W.1, at 6.30 p.m.)
- 30 April and 1 May. Iron and Steel Institute.** Annual General Meeting. (4 Grosvenor Gardens, London, S.W.1.)

APPOINTMENTS VACANT

A **VACANCY** exists for a man who has extensive experience in the extrusion of light alloys and who will be required to carry out development work on improving the productivity of presses and accelerating finishing operations. A person with experience on production of extruded sections, rods, tubes, and wire, would be preferred. Salary to be discussed at interview, but will be in range of £800-£1,100 per annum. Applications in writing to Staff Officer, Box No. 349, Institute of Metals, 4 Grosvenor Gardens, London, S.W.1.

MAGNESIUM ELEKTRON, LTD., have vacancy for experienced metallurgist for Research Department. Must have personality and ability to control Inspection Section, as well as technical qualifications of normal average calibre. Written applications should be addressed to Secretary, Magnesium Elektron, Ltd., Clifton Junction, Nr. Manchester.

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The Hot Working of Magnesium and Its Alloys, by R. G. Wilkinson (Magnesium Elektron, Ltd.) and F. A. Fox (H. J. Enthoven and Sons, Ltd.).

The Hot Working of Copper and Copper Alloys, by Maurice Cook and Edwin Davis (Imperial Chemical Industries, Ltd., Metals Division).

The Hot Working of Tin-Bronzes, by D. W. Dugard Showell (The Birmingham Battery and Metal Co., Ltd.).

The Hot Working of Lead and Lead-Rich Alloys, by L. H. Back (British Non-Ferrous Metals Research Association).

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The Cold Rolling of Non-Ferrous Metals in Sheet and Strip Form, by C. E. Davies (W. H. A. Robertson and Co., Ltd.).

Wire-Drawing Technique and Equipment, by F. T. Cleaver and H. J. Miller (British Insulated Callender's Cables Ltd.).

The Deep Drawing and Pressing of Non-Ferrous Metals and Alloys, by J. Dudley Jevons (Joseph Lucas, Ltd.).

General Discussion on Metallurgical Aspects of the Cold Working of Non-Ferrous Metals and Alloys.

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